

**1998 ANNUAL REPORT OF
ELECTRIC SERVICE RELIABILITY
FOR THE ILLINOIS DISTRICT OF
MIDAMERICAN ENERGY COMPANY**

May 27, 1999

A. Plan for Future Investment and Reliability Improvements

[411.120 b)3) A)]

i. Description of MidAmerican Energy Company's (MidAmerican) Illinois District [411.120 b) 3) A) i)]

The Illinois District service territory includes the greater Illinois Quad Cities area which is predominately urban and outlying areas in and around the cities of Sherrard, Orion and Reynolds which are mostly rural. The Illinois District is supplied by a 345 kV, 161 kV and 69 kV networked transmission system. There are three 345/161 kV and five 161/69 kV substations served off this network in the Quad Cities (Iowa and Illinois) area. The 161 kV and 69 kV supply from these substations loops throughout the Quad Cities area to serve several 161/13 kV and 69/13 kV substations. These substations supply a radial 13.2 and 4 kV distribution system. The distribution system utilizes approximately 7,460 overhead conductor-miles and 520 underground conductor-miles to serve 86,175 customers in the Illinois District.

The Illinois District transmission system is composed of approximately 13,586 wood poles and supporting structures with an average age of approximately 32 years as well as other non-wood structures. The Illinois District distribution system is composed of approximately 83,914 poles and supporting structures with an average age of approximately 28 years. All Illinois District transmission and distribution lines are inspected over a period not exceeding ten years. As a result of these periodic inspections and follow-up maintenance and construction, the transmission and distribution facilities maintain adequate mechanical and electrical properties to provide continued safe and reliable service to MidAmerican's Illinois customers.

ii. Projects to Address Reliability Challenges and Associated Time Table [411.120 b) 3) A) ii) - iv), vi) & vii)]

Each year as part of MidAmerican's Transmission and Distribution (T&D) Capital Budgeting process, the Transmission and Distribution Planning Department reviews the Illinois District electric system for the next five years to determine what capital improvements are required to maintain a safe and reliable system. This review includes all transmission projects, and those distribution projects with an estimated cost greater than or equal to \$100,000. For each project reviewed, the customer value of expected unserved energy is calculated to determine the impact on the customer. Unserved energy is calculated using expected frequency of outage, expected duration of outage and load impacted. The 1998 T&D Capital Budgeting process review showed no major capital projects are required in the Illinois District through 2002.

Capital projects for the Illinois District distribution system less than \$100,000 come from the Illinois District Operations group. Major capital projects budgeted through 2002 are shown in Attachment A.

In addition to the above capital projects, MidAmerican also has ongoing inspection and maintenance programs for its transmission and distribution systems in the Illinois District. Each program with a short description is listed in Attachment B.

The above projects and on-going inspection programs are in place to address all outages causes. Both Capital and O&M expenditures are allocated based on the most critical

need and where the best benefit for the expenditure can be obtained. The cost for these capital and operations and maintenance (O&M) reliability projects are included in MidAmerican's Electric Capital and O&M budgets. Projected Electric Capital and O&M budget expenditures by MidAmerican in the Illinois District for 1999-2002 are:

**Budgeted Transmission Capital¹ and O&M² Expenditures
Illinois District
1999 – 2002
(\$1,000'S)**

Category	1999	2000	2001	2002
Capital	\$ 472	\$1,918	\$ 408	\$ 174
O&M	\$1,467	\$1,506	\$1,547	\$1,588

- 1- This represents budgeted capital dollars for projects directly attributable to the Illinois District.
- 2- This represents Illinois District 1999 budgeted O&M expenses allocated to transmission based on 1998 percentage split for transmission. 2000 – 2002 O&M dollars were derived by escalating 1999 O&M dollars by 3% for labor and 2.5% for non-labor.

Budgeted transmission capital dollars increase in the year 2000 due to projected installation of a third 161/13 kV transformer at Substation 49 in the Illinois District.

**Budgeted Distribution Capital³ and O&M⁴ Expenditures
Illinois District
1999 – 2002
(\$1,000'S)**

Category	1999	2000	2001	2002
Capital	\$3,032	\$2,994	\$2,815	\$2,919
O&M	\$7,175	\$7,374	\$7,578	\$7,788

- 3- This represents budgeted capital dollars for projects directly attributable to the Illinois District.
- 4- This represents Illinois District 1999 budgeted O&M expenses allocated to distribution based on 1998 percentage split for distribution. 2000 – 2002 O&M dollars were derived by escalating 1999 O&M dollars by 3% for labor and 2.5% for non-labor.

iii. Unresolved Reliability Complaints and Actions Taken – Other Utilities, ISOs, ARESs [411.120 b) 3) A) v) & 411.120 b) 3) A) vi)]

MidAmerican Energy Company has no unresolved reliability complaints for the Illinois District to report under this section.

B. Implementation of Plan for Future Investment for 1997

[411.120 b) 3) B)]

As this is the first year for submitting the Annual Report, there is nothing to report for the previous annual reporting period.

C. Number and Duration of Planned and Unplanned Interruptions and Impact on Customers [411.120 b) 3) C)]

On November 15, 1998, MidAmerican converted from its old mainframe-based Electric Outage Analysis System (EOAS) to its new PC-based Electric Outage Management System (EOMS). The new system provides the flexibility to obtain the planned and unplanned interruption number, duration and customer impact data required under this section. The old mainframe-based system consisted of batch reports that only included a report summary of planned and unplanned interruption numbers. It did not include reports for planned and unplanned interruption duration or customer impact. Therefore, the interruption duration and customer impact data provided under this section is limited to the period from November 15, 1998 to December 31, 1998. Data on the number of planned and unplanned interruptions covers the entire annual reporting period, January 1, 1998 to December 31, 1998. The 1999 Annual Report will include a full year of data.

**Planned and Unplanned Interruption Number and Duration
Illinois District
(November 15, 1998 – December 31, 1998)**

Interruption Type	Number of Interruptions	Average Duration (per interruption)
Planned	3	48 minutes
Unplanned	264	108 minutes

**Planned and Unplanned Interruption Number
Illinois District
(January 1, 1998 – December 31, 1998)**

Interruption Type	Number of Interruptions
Planned	31
Unplanned	3,943

The impact of both planned and unplanned interruptions on Illinois District customers can be demonstrated by the number of customers experiencing interruptions and the average duration per customer interruption.

**Planned and Unplanned Interruption
Number and Duration by Customer
Illinois District
(November 15, 1998 – December 31, 1998)**

Interruption Type	Customers Interrupted	Average Duration (per customer interruption)
Planned	35	49 minutes
Unplanned	3,384	79 minutes

D. Number and Causes of Controllable Interruptions [411.120 b) 3) D)]

MidAmerican has identified the majority of interruption causes as controllable. The listing of controllable and uncontrollable interruption causes is provided in Attachment C. Under atypical severe weather conditions, identified by when the Illinois District storm center is open for two or more days, the interruptions under the cause categories of 'Equipment OverHead (OH)', 'Equipment UnderGround (UG)', 'Substation', 'Transmission', 'Tree Related' and 'Weather', in Attachment C are considered to be uncontrollable. The Illinois District storm center was open for two or more days twice during 1998. The first time was from June 18, 1998 to June 21, 1998 and the second time was from June 29, 1998 to July 1, 1998.

Below is a summary of the number of controllable interruptions in the Illinois District during 1998.

Illinois District Controllable Interruptions 1998	
Cause	Number
Animal Related	697
Overhead Equipment Related	630
Underground Equipment Related	117
MEC/Contractor Personnel Errors	4
Other	3
Unknown	156
Intentional	36
Transmission and Substation Equipment Related	0
Tree Related	402
Weather Related	281

E. Customer Interruptions due to another Utility, Independent System Operator, Alternative Retail Electric Supplier [411.120 b) 3) E)]

There were zero outages in the Illinois District during 1998 due to another utility, independent system operator or alternative retail electric supplier.

F. Reliability Comparison of Customers buying Electric Energy from MidAmerican Energy Company versus from Another Utility or ARES. [411.120 b) 3) F)]

There were no Illinois District customers buying energy from another utility or alternative retail electric supplier during 1998.

G. Report on Reliability of Existing Transmission and Distribution Systems [411.120 b) 3) G)]

i. Qualitative Characterization of MidAmerican Transmission and Distribution System [411.120 b) 3) G) i)]

MidAmerican's Illinois District transmission system is composed of approximately 13,586 wood poles and supporting structures with an average age of approximately 32 years as well as other non-wood structures. The Illinois District distribution system is composed of approximately 83,914 wood poles and supporting structures with an average age of approximately 28 years. These ages are based on a weighted average of the age of the wood poles and supporting structures. MidAmerican views the current condition of both the transmission and distribution system as safe, in good repair, and in compliance with the applicable laws and code(s).

The criteria used to assess the current condition of MidAmerican's Illinois District system are the results of recent inspections completed in compliance with the T&D inspection program described in Section 411.120 3) A) iii) of this Report. Based on these results, it can generally be concluded that the existing facilities maintain adequate mechanical and electrical properties to provide continued safe and reliable service to MidAmerican's customers.

ii. **Interruption and Voltage Variance Summary** [411.120 b) 3) G) ii)]

MidAmerican's Illinois District serves 86,175 customers. In 1998, the Illinois District experienced 185,712 customer interruptions which affected 72,632 customers. The total interruption time associated with these interruptions was 27,083,842 customer-minutes.

Reliability Indices for the Illinois District are as follows:

**ILLINOIS DISTRICT
1998 ELECTRIC RELIABILITY
INDICES**

SYSTEM ¹ AVERAGE INTERRUPTION FREQUENCY INDEX	CUSTOMER ² AVERAGE INTERRUPTION DURATION INDEX	CUSTOMER ³ AVERAGE INTERRUPTION FREQUENCY INDEX
2.155	145.84	2.557

$$1 - \text{SAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{185,712 \text{ Customer-Interruptions}}{86,175 \text{ Customers}}$$

$$2 - \text{CAIDI} = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{27,083,842 \text{ Customer-Interruption minutes}}{185,712 \text{ Customer-Interruptions}}$$

$$3 - \text{CAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{185,712 \text{ Customer-Interruptions}}{72,632 \text{ Customer Affected}}$$

iii. **Expenditures for Transmission Construction and Maintenance** [411.120 b) 3) G) iii)]

**Expenditures for Illinois District
Transmission Construction¹ and Maintenance²
(\$1,000's)
(1996 – 1998)**

	1998	1997	1996
Construction	\$ 842	\$ 4,652	\$ 656
O&M	\$ 1,383	\$ 1,427	\$ 1,158
Total	\$ 2,225	\$ 6,079	\$ 1,814

1- This represents capital dollars for projects historically budgeted as transmission and directly attributable to the Illinois District.

2- These dollars come from MidAmerican's FORM 21 ILCC filing with the Illinois Commerce Commission, page 5, Section VIII. 'Operating Revenues and Expenses', Line No. 4 'Transmission' for December 31 of the year as noted.

Transmission construction dollars increased in 1997 due to construction of a new 161/13 kV two transformer substation (Substation 49) and associated 161 kV transmission lines in the Illinois District.

**Ratio of Illinois District Transmission Construction and Maintenance Expenditures
to Illinois District Transmission Investment
(1996 – 1998)**

	1998	1997	1996
Transmission Investment (depreciated)	\$32,426,637	\$32,308,172	\$34,283,099
Ratio (Total/ Transmission Investment (depreciated))	6.9%	18.8%	5.3%

**Average Remaining Depreciation Lives of
Illinois District Transmission Facilities
as a Percent of Total Depreciation Lives
(1996 – 1998)**

Account	Description	% Remaining Life		
		1998	1997	1996
350.1	Land Rights	53%	55%	57%
352	Structures	64%	58%	59%
353	Station Equipment	69%	71%	69%
354	Towers & Fixtures	52%	54%	56%
355	Poles & Fixtures	70%	71%	70%
356	Overhead Conductor	63%	63%	62%
	Devices			
356.1	Overhead Conductor	19%	24%	29%
	Devices - IowaPower			
358	Underground Conductor	58%	59%	44%
	Devices			
359	Roads & Trails	25%	27%	29%

iv. **Expenditures for Distribution Construction and Maintenance** [411.120
b) 3) G) iv)]

**Expenditures for Illinois District
Distribution Construction¹ and Maintenance²
(\$1,000's)
(1996 – 1998)**

	1998	1997	1996
Construction	\$ 4,088	\$ 2,833	\$ 3,005
O&M	<u>\$ 6,765</u>	<u>\$ 7,399</u>	<u>\$ 5,074</u>
Total	<u>\$ 10,853</u>	<u>\$ 10,232</u>	<u>\$ 8,079</u>

1- This represents specific Illinois District project dollars historically budgeted as distribution and an allocation of specific project common dollars historically budgeted as distribution to the Illinois District.

3- These dollars come from MidAmerican's FORM 21 ILCC filing with the Illinois Commerce Commission, page 5, Section VIII. 'Operating Revenues and Expenses', Line No. 4 'Distribution' for December 31 of the year as noted.

The increase in construction dollars in 1998 is primarily due an increase in governmental rebuilds and projects.

**Ratio of Illinois District Distribution Construction and Maintenance Expenditures
to Illinois District Distribution Investment
(1996 – 1998)**

	1998	1997	1996
Distribution Investment (depreciated)	\$ 68,039,834	\$ 65,934,447	\$ 67,306,105
Ratio (Total/ Distribution Investment (depreciated))	16.0%	15.5%	12.0%

**Average Remaining Depreciation Lives of
Illinois District Distribution Facilities
as a Percent of Total Depreciation Lives
(1996 – 1998)**

Account	Description	% Remaining Life		
		1998	1997	1996
360.1	Land Rights	67%	62%	(1)
361	Structures	68%	66%	66%
362	Station Equipment	66%	67%	68%
364	Poles/Towers/Fixtures	61%	62%	64%
365	Overhead Conductor	69%	70%	71%
366	Underground Conduit	67%	68%	68%
367	Underground Conductor Devices	72%	73%	74%
368	Line Transformers	63%	64%	65%
369	Services	66%	66%	67%
370	Meters	68%	68%	69%
371	Installations on Customers Premises	55%	57%	58%
373	Street Lights	79%	80%	81%

(1) – The useful life for this account was redefined during 1996

v. Customer Satisfaction Survey Results [411.120 b) 3) G) v)]

See Attachment D for the results of the Illinois District Residential and Commercial Reliability Survey. Due to the small sample size used in the survey, the results are subject to an error of plus or minus ten percent.

vi. Overview of Customer Reliability Complaints [411.120 b) G) vi)]

There were two Illinois District electric reliability complaints made to the Illinois Commerce Commission and forwarded to MidAmerican's Customer Service Quality Department in 1998. The complaints and their resolutions are listed in Attachment E.

H. Reliability Indices [411.120 b) H)]

**ILLINOIS DISTRICT
1998 ELECTRIC RELIABILITY
INDICES**

**SYSTEM¹
AVERAGE
INTERRUPTION
FREQUENCY
INDEX**

2.155

**CUSTOMER²
AVERAGE
INTERRUPTION
DURATION
INDEX**

145.84

**CUSTOMER³
AVERAGE
INTERRUPTION
FREQUENCY
INDEX**

2.557

$$1 - \text{SAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{185,712 \text{ Customer-Interruptions}}{86,175 \text{ Customers}}$$

$$2 - \text{CAIDI} = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{27,083,842 \text{ Customer-Interruption Minutes}}{185,712 \text{ Customer-Interruptions}}$$

$$3 - \text{CAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{185,712 \text{ Customer-Interruptions}}{72,632 \text{ Customers Affected}}$$

I. Worst Performing Circuits [411.120 b) I)]

The following table shows the worst performing circuits in 1998 in the Illinois District according to the calculated indices.

Illinois District Worst Performing Circuits of 1998

Index Used	Index Value	Circuit Designation	Number of Customers
SAIFI	7.792	524188-587097	884
CAIDI	1,381.3	443409-563892	935
CAIFI	7.881	524188-587097	884

J. Operating & Maintenance History of the Worst-Performing Circuit [411.120 b) 3) J)]

Circuit 524188-587097

$$\text{SAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Served}} = \frac{6,888 \text{ Customer-Interruptions}}{884 \text{ Customers}}$$

$$\text{CAIFI} = \frac{\text{Number of Customer Interruptions}}{\text{Number of Customers Affected}} = \frac{6,888 \text{ Customer-Interruptions}}{874 \text{ Customers Affected}}^1$$

1 – Although this circuit experienced several lock-outs as explained below, the ‘Customers Affected’ count differs slightly from the ‘Customers’ count because the ‘Customer’ count was taken after the last lock-out occurred.

The circuit with the highest SAIFI and CAIFI indices was circuit 524188-587097, which had 884 customers in 1998. The elevated SAIFI and CAIFI indices are due to six circuit lockouts this circuit experienced in 1998. The first was due to an unknown cause in March. The circuit was placed back in service in four minutes. The second and third were due to wind and tree contact respectively during April. The fourth and fifth both involved lightning with wind and tree contact contributing factors on the fifth lock out. The sixth lockout was due to tree contact.

This circuit was inspected and tree trimming was performed in 1997. Items needing correction were started on in 1998 by Illinois District Operations and are expected to be complete in 1999. Tree trimming is scheduled to be performed again in 2000.

Circuit 443409-563892

$$\text{CAIDI} = \frac{\text{Sum of all Interruption Durations}}{\text{Number of Customer Interruptions}} = \frac{113,270 \text{ Customer-Interruption minutes}}{82 \text{ Customer-Interruptions}}$$

The circuit with the highest CAIDI index was circuit 443409-563892, which had 935 customers in 1998. This figure came from a total of 82 customer interruptions. The longer durations are attributable to a storm on June 18, 1998. The circuit’s CAIDI index was elevated due to three separate extended outages during this storm which affected a total of 62 customers for time periods of between 25 hours and 34 hours.

This circuit was last inspected in 1990 and is on the Illinois District’s 10-year inspection cycle program and is due for inspection again in the year 2000. Tree trimming on this circuit was last performed in 1995 and is scheduled in 1999.

K. Three Year Customer Outage Frequency Data [411.120 b) 3) K)]

No report is due until the June 1, 2001 filing.

L. Three Year Customer Outage Duration Data [411.120 b) 3) L)]

No report is due until the June 1, 2001 filing.

M. Contact Person [411.120 b) 3) M)]

If there are questions or any additional information is needed please contact the following:

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